



VOTER VERIFIED PAPER AUDIT TRAIL Pilot Project Report

**SB500
2006 Georgia Accuracy in Elections Act**

**Office of the Secretary of State
Elections Division
April 2007**

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*Exit Poll Questions/Methodology and Public Hearings transcripts are available upon request.



Section 1

Introduction

Introduction

Senate Bill 500, “The 2006 Georgia Accuracy in Elections Act”, was enacted by the Georgia General Assembly and signed into law by Governor Sonny Perdue on April 28, 2006. This legislation implemented a pilot program providing for the use of direct recording electronic (DRE) voting equipment configured with an elector verified, permanent paper record of the votes cast by each elector on each DRE unit in one precinct each in Bibb, Camden, and Cobb Counties. The pilot program was conducted during the November 7, 2006 General Election and the December 5, 2006 Runoff Election. The bill also authorized a manual audit of the paper trail for both elections.

All aspects of the Voter Verified Paper Audit Trail (VVPAT) were conducted by the Elections Division of the Secretary of State’s Office of Georgia in coordination with Bibb, Camden, and Cobb County elections offices. The counties were selected based upon the voter registration statistics, county size and geographical location and facility availability for conducting the requisite public hearings.

The equipment used in the pilot program was the Diebold AccuVote TSX. Senate Bill 500 mandated that the pilot equipment “be the same general type from the same vendor or manufacturer as those DRE units in use in the state.” The use of this equipment allowed a total of 2,038 electors in three precincts to use a familiar voting interface with an attached printer for vote selection verification.

This report includes objectives, procedures, and results for both the voter and audit sections of the pilot program. Key findings and comments from the exit poll, public hearings, and county elections officials are an integral part of the report.



Section 2

Senate Bill 500

Senate Bill 500 Summary

The Act provided for a pilot program during the November 7, 2006 General Election and the subsequent December 5, 2006 Runoff Election in specific Georgia counties to test electronic recording voting systems. Pursuant to the Act, the voting system should produce a permanent paper record of the votes recorded on the system giving voters the opportunity to verify their recorded vote.*

Section 2, Senate Bill 500

The Act mandated the use of Direct Recording Electronic units configured with a voter verified, permanent paper record of the votes cast by voters in one precinct each in the counties of Bibb, Camden, and Cobb. In addition, the Act requires that each DRE unit was to be of the same general type from the same vendor or manufacturer as the DRE units currently in use in this state. Each DRE unit was required to receive national qualification and have passed state certification for use in elections. The Secretary of State was authorized to provide for a conditional certification of the units which expired on December 31, 2006.

Specifications:

1. The unit shall display a summary of the choices which the voter has made.
2. The voter shall be notified of any races or questions in which the voter did not make a selection. All other choices of the voter shall be displayed for his/her review.
3. Voter shall have opportunity to change any choices.
4. Voter shall only be allowed to vote in those races in which he/she did not previously make a selection.
5. Prior to the voter casting his or her vote on the unit, the unit shall print a permanent paper record of his/her votes.
6. Voter shall then review the record and if correct, he or she will press the appropriate button on the unit or screen to actually cast the ballot. This will cause the paper ballot to be deposited in a ballot box or other secure container.

* * While the language of Senate Bill 500 provided the voter an opportunity to verify his or her recorded vote after the vote was actually cast, there is no technology currently available on the market to satisfy such a demand. The pilot project conducted by the Office of the Secretary of State provided a voter the opportunity to review the permanent paper record before casting his or her vote.

7. If the votes shown on the paper record are incorrect, the unit shall allow the voter to reject and void the paper record.
8. The voter will only be allowed to adjust their vote 3 times before casting the ballot.
9. Ballot boxes shall not be opened nor ballots counted unless and until required for the purpose of a recount or in the event of a contested proceeding.
10. The Secretary of State will mandate that a manual audit will be performed on each DRE unit used in the pilot project within 30 days following the 2006 General Election and within 30 days of the Runoff election.
11. The audit shall compare the results of the permanent paper records from each DRE unit with the electronic record recorded by the DRE unit.
12. A summary of the findings, as well as the comments received, shall be submitted to the General Assembly and made available to the general public.
13. Act is to be repealed on February 1, 2007.

*Senate Bill 500 in its entirety is located in Appendix B of this report.



Section 3

Voting Equipment Selection

Voting Equipment Selection

Senate Bill 500 required that the pilot project assess voting hardware that conformed to the following specifications:

1. Touch screen direct recording electronic (DRE) voting equipment of the same vendor or manufacturer as those currently in use in Georgia.
2. Passed state certification for use in elections as well as receive national qualification.
3. Each unit shall produce a voter verified, permanent paper record of the votes cast by each voter.
4. Equipment configured to allow voter to review paper record and to make changes to the ballot prior to casting their vote.
5. Each unit shall have a storage device that stores the paper record at the same time as such voter's votes are stored electronically by the DRE unit.
6. Storage device shall be able to be removed from DRE unit for the purpose of transporting the paper records to a central tabulating center.

Pilot Voting Equipment Selected: Diebold Accu Vote TSX

Note: The Diebold Accu Vote TSX is similar, but not identical to the voting units currently used in Georgia. The purchase of the Diebold Accu Vote TSX would require the replacements of all 25,136 voting units that are currently in use in Georgia.

Reason Selected: The Diebold Accu Vote TSX was the only voting unit produced by Diebold that met Senate Bill 500's voting requirements.

Current Voting Equipment: Georgia conducts its election on the Diebold R6 and the Diebold TSX. These units are not equipped with a VVPAT printer attachment, and Diebold does not currently manufacture a VVPAT printer attachment for these particular models.



**Figure 1 Diebold AccuVote TSX
with AccuView Printer Module Attached**



Section 4

VVPAT Test Pilot Polling Precincts

VVPAT Test Pilot Polling Precincts

Senate Bill 500 designated Bibb, Camden and Cobb Counties as the pilot program recipients of the Diebold Accu Vote TSX voting units. Counties were selected based upon the voter registration statistics, county size and geographical location. Precincts within those counties were selected based upon the extent of their poll workers training as well as their county election office recommendations.

Bibb County-Godfrey 5
Jessie Rice School
3750 Jessie Rice Street
Macon, Georgia 31206

Voter Registration Demographic Statistics as of November 1, 2006

Reg. Status	Black	White	Asian-PI	Hisp-LT	Other	Total
Active	1076	391	6	6	34	1,513

Camden County-Woodbine 03
Woodbine City Hall
310 Bedell Avenue
Woodbine, Georgia 31569

Voter Registration Demographic Statistics as of November 1, 2006

Reg. Status	Black	White	Asian-PI	Hisp-LT	Other	Total
Active	453	850	2	3	35	1,343

Cobb County-Maclang 01
McEachern Memorial United Methodist Church
4075 Maclang Road
Powder Springs, Georgia 30127

Voter Registration Demographic Statistics as of November 1, 2006

Reg. Status	Black	White	Asian-PI	Hisp-LT	Other	Total
Active	866	1209	19	45	88	2,227

Equipment Training and Testing

On August 28, 2006 the Bibb, Camden and Cobb Elections Officials, poll workers and technicians attended extensive training on the use of the Diebold Accu Vote TSX voting unit at Kennesaw State University Center for Elections Systems. In October 2006 the counties independently conducted simulated poll worker training that included open & close procedures in order to further familiarize their personnel with the administration of the voting unit. In addition, Bibb, Camden and Cobb Elections Officials conducted logic & accuracy testing on every Diebold Accu Vote TSX voting unit that was implemented in the pilot. All training and testing conducted by the county elections officials were administered at their elections offices.



Section 5

Election Day VVPAT Evaluation

Election Day Overview

Pursuant to Section 2 of Senate Bill 500, “The 2006 Georgia Accuracy in Elections Act”, VVPAT voting units were deployed for use in the November 7, 2006 General Election and the subsequent December 5, 2006 Runoff Election for the purpose of conducting a test pilot of permanent paper records of the votes recorded on such systems. The Office of the Secretary of State in conjunction with the Survey Research Center at the University of Georgia conducted an exit poll at the three pilot counties to assess voter satisfaction and confidence in a paper trail electronic voting system. In addition to the poll manager and the poll workers, each polling location was staffed by a designated technician to assist with any technical and logistical issues that could arise with the Diebold Accu Vote TSX VVPAT voting units. The Cobb County VVPAT polling location experienced voting lines of 1 ½ to 2 hours throughout Election Day as compared to lines of 20 to 50 minutes in the Cobb County non VVPAT polling locations.

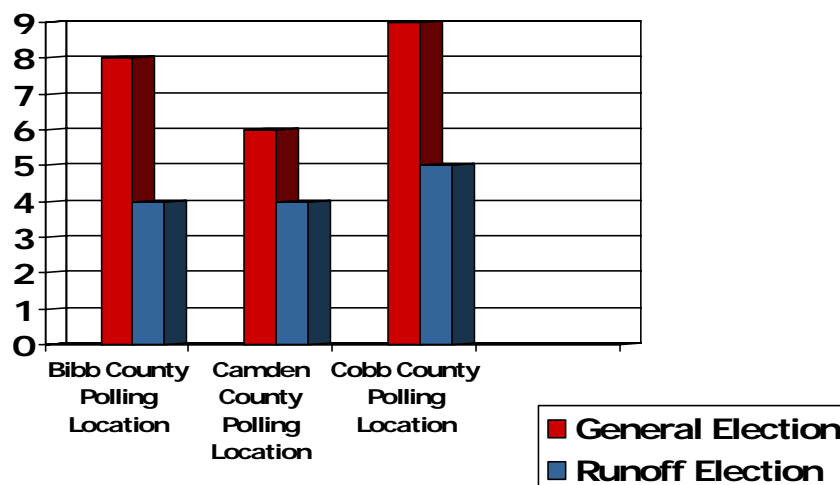
Election Day Objectives:

1. Evaluate ease of use by poll workers.
2. Evaluate ease of use by voters.
3. Evaluate technical issues.
4. Evaluate voter confidence of system.

Methodology:

1. Observation Reports submitted by county elections offices.
2. Exit Poll Survey of voters conducted by the University of Georgia Survey Research Center.

Number of Accu Vote TSX VVPAT voting units used in the November 7, 2006 General Election and December 5, 2006 Runoff Election*



* The number of VVPAT voting units employed in the pilot polling locations was consistent with the number of voting units used in prior elections that were conducted without the use of VVPAT technology.

Election Day Report

Bibb County (Godfrey 5)	General Election 2006	Runoff Election 2006
Number of Voters	592	88
Technical Issues	2	0

There were two technical issues reported at the Bibb County polling location. The first occurred when a voter noticed that the paper trail failed to print. The voting unit in question was taken offline by the designated technician until the issue was resolved. The voter was eventually able to successfully print the paper trail and cast the ballot. The second issue occurred when the designated technician noticed that the paper trail in a voting unit had jammed. The technician proceeded to take the unit offline and reassemble the voting machine altogether.

Camden County (Woodbine 03)	General Election 2006	Runoff Election 2006
Number of Voters	470	38
Technical Issues	3	0

There were three technical issues reported at the Camden County polling location. The first occurred when a VVPAT voting unit displayed an erroneous “low paper” error message after a voter inserted the voter access card into the voting unit. Upon inspection by poll workers, it was determined that a paper jam had occurred in the voting unit’s printer. The second issue occurred when the same VVPAT voting unit experienced another paper jam. At the discretion of the poll manager, the voting unit was taken out of service for the remainder of the day. The third issue occurred when another VVPAT voting unit displayed the erroneous “low paper” error message. Upon inspection by poll workers, it was found that a paper jam had occurred in the voting unit’s printer.

Cobb County (Macland 01)	General Election 2006	Runoff Election 2006
Number of Voters	976	40
Technical Issues	1	0

There was one reported technical issue at the Cobb County polling location. The issue occurred when a VVPAT voting unit displayed a “printer failure” error message as a voter was printing the paper trail ballot. The voting unit cancelled the voter’s ballot and rejected the voter access card. The voter was reissued a new ballot and a new voter access card and proceeded to successfully vote on another VVPAT voting unit.

November 7, 2006 General Election Exit Poll Results

On November 7, 2006, the Survey Research Center at the University of Georgia, in conjunction with the Office of the Secretary of State of Georgia, conducted an exit poll at three selected Georgia election precincts to assess voter satisfaction and confidence in a paper trail electronic voting system. Exit pollsters successfully interviewed 459 voters. The response interview rate was thus 23.7, well below expectations. However, the distribution of voters interviewed matched demographic characteristics of each precinct extremely well, boosting confidence that a representative sample of voters was obtained. Assuming the 459 voters interviewed represent a random sample of all voters in the three precincts the maximum estimated theoretical sampling margin of error would +/- 4.6% at the 95 percent confidence interval.

Statistics Regarding Voter Experience with the VVPAT Voting Units

- 99.3% of voters interviewed reported noticing that the electronic voting machine used on November 7th printed a paper trail showing their voter choice.
- 95.6% of voters reported that the paper trail voting system was easy to use.
- 89.3% of voters reported having previously voted on Georgia's electronic touch screen voting units.
- 35.7% of voters found the paper trail voting system to be easier than the electronic-only voting system, while 56.7% reported there was no difference between the two. 7.6% of voters reported that the paper trail was not easier than the electronic-only voting system.
- 51.3% of voters reported that the paper trail voting system took no longer to vote with than the electronic only system, while 19.4% reported no difference, and 29.3% reported it took longer to vote with the paper trail voting system.
- 3.5% of voters reported having problems printing the paper trail, with half of those reporting the problem was the length of time it took to print the ballot. 2.6% of voters reported having any problems reading the paper trail, with half of these voters reporting that the print was too small.
- 43.7% of voters reported that poll workers were able to assist them if they experienced any technical problems while voting, and 54.4% of voters reported experiencing no technical problems while voting. 1.8% of voters reported poll workers were not able to assist them with technical problems experienced while voting. Non-white voters were significantly more likely than white voters (49.2% versus 37.2%) to report that poll workers were not able to assist them with technical problems experienced while voting.

- 79.1% of voters reported reviewing their paper trail, and 95.9% reported the paper trail was easy to read. Non-white voters were significantly more likely to report reviewing their paper trail than were white voters (84.6% non-white versus 70.8% white).
- 99.8% of voters reported that the paper trail reviewed correctly reflected the ballot choices the voter selected.

Statistics Regarding Voter Confidence with the VVPAT Voting Units

- 87.7% of voters described their overall experience voting on Election Day as good, while 10.9% reported fair, and 1.3% reported poor.
- 86.9% of voters reported being either very confident or somewhat confident in the accuracy and security of the touch screen voting units, and 89.4% reported being very confident or somewhat confident in the paper trail voting system used on election day. Non-white voters were significantly more likely to report not being confident in the accuracy and security of the touch screen voting units (12.9% non-white versus 5.9% white), and significantly more likely to report not being confident in the paper trail voting system used on election day (6.8% non-white versus 2.2% white). Female voters were significantly more likely than male voters to report confidence in the accuracy and security of the touch screen units.
- 82.4% of voters favored adding a reviewable paper trail like the one used on Election Day to Georgia's voting system, while 5.9% opposed a paper trail system, and 7.3% were not sure. 4.4% reported having no opinion on the matter.



Section 6

Manual Audit of Paper Trail

Manual Audit Overview

Pursuant to Senate Bill 500, Section 2, the Elections Division of the Secretary of State's office administered a complete manual audit of the elections results printed on the Diebold Accu Vote TSX VVPAT voting units used in the pilot. The audit was conducted for both the November 7, 2006 General Election and the subsequent December 5, 2006 Runoff Election.

Objectives:

1. Compare the results of the permanent paper record trail created by the VVPAT units with the electronic record recorded by the DRE units.
2. Evaluate feasibility of a physical audit of Diebold Accu Vote TSX VVPAT physical audit.

Methodology:

1. Manual audit procedures defined by the Office of the Secretary of State.
2. The results of each county manual audit were documented in observation reports that were submitted to the Office of the Secretary of State's Elections Division. Additional details regarding the manual audit were recorded in the transcripts from the Voter Verifiable Paper Audit Trail Public Hearings held in Bibb, Camden, and Cobb Counties.

Manual Audit Procedures

Project Overview

Each county employed audit teams consisting of three members. Listed below are the step by step procedures that the teams adhered to when conducting the manual audit of the VVPAT. All aspects of the manual audit process were in full public view.

Step by Step Procedures for each voting unit:

Supervisor of Elections:

1. Record the VVPAT summary results from the end of the paper trail.

Team:

1. Unroll the VVPAT cartridge on the manual count table so that the first ballot is visible.
2. Check to see if the ballot was "REJECTED". If so, draw an "X" through the entire ballot and skip to step 6.
3. Two members of the team are responsible for verifying the selections for each race on the ballot. Both members must agree on every vote that is recorded on the tally sheet named **Primary Tally Sheet**.
4. The third member of the team will record the results for each race from the reading onto the **Primary Tally Sheet**.
5. Make a mark on the VVPAT for every race that has been recorded onto the **Primary Tally Sheet**.
6. As long as another ballot is on the paper, move the paper roll on the table so the ballot is visible and return to step 2.
7. At this point all ballots on the roll have been recorded on the **Primary Tally Sheet**. All three members of the team will now count and total the results that were recorded.
8. The Elections Supervisor will compare results from the **Primary Tally Sheet** to the VVPAT summary.
9. The manual audit for that paper trail roll is complete if there is no discrepancy between the vote total from the **Primary Tally Sheet** and the VVPAT summary.
10. If there is a discrepancy between the **Primary Tally Sheet** results and the VVPAT summary, the Elections Supervisor will deliver that VVPAT to the alternating team for the purpose of auditing the ballots.
11. The alternating team will repeat steps 1-10 of the auditing process using the **Secondary Tally Sheet** until the discrepancy is resolved.**

** If after two secondary tallies, there is still a discrepancy between the tally sheet results and the VVPAT summary, notify the E

Manual Audit Observation Summary Bibb County
Conducted at Bibb County Elections Office
2445 Pio Nono Avenue Macon, Georgia

Data Calculated	General Election 2006	Runoff Election 2006
Number of Auditors	8	8
Number of Ballots Audited	592	88
Number of Races per Ballot	39	1
Amount of Man Hours	208 hours	NA
Amount of Lapsed Time	26 hours	NA
Average Time to Audit Ballot	21 minutes	NA
Labor Cost Associated with Manual Audit	\$1,782	NA

Manual Audit Observation Summary Camden County
Conducted at Camden County Elections Office
200 East 4th Street Woodbine, Georgia

Data Calculated	General Election 2006	Runoff Election 2006
Number of Auditors	6	3
Number of Ballots Audited	470	38
Number of Races per Ballot	34	1
Amount of Man Hours	87 hours	NA
Amount of Lapsed Time	14.5 hours	NA
Average Time to Audit Ballot	11 minutes	NA
Labor Cost Associated with Manual Audit	\$1,414	NA

Manual Audit Observation Summary Cobb County
Conducted at Cobb County Elections Office
736 Whitlock Avenue Marietta, Georgia

Data Calculated	General Election 2006	Runoff Election 2006
Number of Auditors	18	6
Numbers of Ballots Audited	976	40
Number of Races per Ballot	42	1
Amount of Man Hours	408 hours	NA
Amount of Lapsed Time	78 hours	NA
Average Time to Audit Ballot	5 minutes	NA
Labor Cost Associated with Manual Audit	\$2,938	NA

Projected Costs of a Countywide Manual Audit

County	Pilot Votes Cast	Votes Cast Countywide*	Projected Countywide Pilot Cost
Bibb	592	37,686	\$113,435
Camden	470	7,991	\$24,053
Cobb	976	179,652	\$540,753

Note: The formula for this projection is the # number of votes cast x \$3.01, which is the cost to audit a ballot based upon a detailed cost itemization provided by Cobb County. The source of the information found in the previous charts can be found in the County Observation Reports located in Appendix B of the report.

*Votes Cast in the November 2006 General Election.



Section 7

VVPAT Public Hearings

VVPAT Public Hearings

In December, 2006, the Elections Division of the Secretary of State's office conducted three public hearings -- one in each of the pilot counties of Bibb, Camden, and Cobb. Respective county elections officials gave an overview of their pilot experience. This was followed by public comments. Public comments specific to the VVPAT Pilot Project was very limited with 4 speakers in Bibb, 5 speakers in Camden, and 11 speakers in Cobb.

Note that a second public hearing regarding "electronic voting machine security" was held in conjunction with the VVPAT Public Hearings. A summary of these comments is available from the Secretary of State's office upon request.

Date	Location	Featured Speakers
December 14, 2006	Camden County Woodbine City Hall Conference Room	Martin Gillette, Supervisor of Elections Gail Whitehead, VVPAT Technician Dan Williams, Manual Auditor
December 19, 2006	Bibb County Jessie Rice Elementary School Cafeteria	Elaine Carr, Supervisor of Elections Teana Dickson, Manual Auditor Jerry Oliver, Manual Auditor
December 21, 2006	Cobb County McEachern United Methodist Church Gymnasium	Sharon Dunn, Supervisor of Elections Mary Jo Davis, Manual Auditor Theresa Harris, Manual Auditor

*Official Public Hearing transcripts are available upon request.



Section 8

Findings and Conclusions

Findings and Conclusions

FINDINGS

Finding 1: Among the pilot project voters, confidence is extremely high in Georgia's current system non-VVPAT voting units. The addition of a VVPAT attachment increases voter confidence from 86.9% to 89.4%.

Finding 2: There is significant public acceptance and support for VVPAT among voters participating in the pilot project.

Finding 3: The manual audit conducted in the three pilot precincts successfully verified that the electronic votes cast matched the votes reported on the VVPAT tape in every precinct and for every race.

Finding 4: Analysis by Elections Officials from the participating pilot counties and the Secretary of State's office revealed numerous and significant issues with the VVPAT voting units technology. Specifically:

- Papers jams
- Inefficient and confusing VVPAT tape layout
- The sequential printing of the paper ballots does not guarantee voter anonymity and vote secrecy as required by Georgia Law.
- Voting time with the VVPAT voting units increased significantly, indicating the need for a greater number of VVPAT machines as well as a machine allocation strategy, were Georgia to move to this platform.

Finding 5: Each pilot voter produced approximately 1.5 feet of paper tape for the November 2006 election. A total of 2,038 voters used the VVPAT voting units – creating over 3,000 feet of paper. If the VVPAT voting units were adopted statewide,

approximately 2.5 million feet of paper would be placed in storage for two years for each General Election.

Finding 6: The manual audit provided a strong indication of the challenges associated with an official and complete recount of an election. As noted in Finding 3, the audit proved that the electronic votes matched the VVPAT votes. However, the audit process was costly, inefficient, time-consuming and highly susceptible to human error.

Cobb County estimates that a county-wide manual audit of its 191 precincts would take 120 days at a cost of \$520,000. With 3,012 precincts in Georgia, a similar complete manual audit would cost millions, require hundreds of additional elections staff, and delay elections certification for weeks if not months.

CONCLUSIONS

The Pilot provided several important and valuable insights into our elections and VVPAT technology. Voters expressed a high degree of confidence in our current election systems, while also supporting the possible use of VVPAT technology. Individual voters that used the VVPAT voting units reviewed a paper record of their votes before they were officially cast. Exit polling showed that, overall, the individual voting experience in this Pilot program was positive for most of the voters in the three precincts. Further, the manual audit of the votes cast in the three demonstration precincts matched 100% the results that were recorded by the electronic voting machines.

The manual audit of the votes cast was particularly challenging for the local election officials managing the audit process. Even with significant training and defined processes and procedures, the audit process proved to be very time-consuming and costly. Local elections officials also reported technical problems with the printers (such as paper jams). Additionally, local elections officials noted particular concern about the increased opportunity for human errors in the hand-counting of the individual votes on the paper roll.

As Georgia's policy-makers move forward in the dialogue concerning the use of VVPAT technology, it is important that we utilize the lessons and observations from the Pilot Program. Voters are confident in our current system. Voters also support VVPAT, although there are important considerations to consider before moving forward with implementation. First, a compatible VVPAT printer attachment for Georgia's existing voting machines does not exist. This means that a complete replacement of our current system would be necessary. Second, there are numerous procedural, technical and practical questions and observations that must be addressed during the selection of a new voting system. Finally, there are several bills pending in the United States Congress that would establish new national standards for the technology and process of federal elections, including specific paper trail requirements.

Given these issues, Georgia should continue to evaluate new voting technology. At the same time, we must also continue efforts to further increase voter confidence. To that end, the Secretary of State's Elections Division has proposed an independent, outside audit of Georgia's elections system. This audit will review the touch screen machine's hardware and software, as well as the existing policies and procedures that govern the conduct of elections. This independent audit will provide additional, unbiased data regarding the security of Georgia's current equipment and offer recommendations for procedural improvements and election audit policies.



Section 9

Glossary of Terms

ACCUVOTE TSX UNIT- A touch screen voting unit that prints a paper record of votes cast. Diebold Elections Systems is the vendor for this product.

BALLOT STYLE - The candidates and choices which are associated with an individual voter at a specific address.

BALLOT TAPE – Printed record of vote selections produced by the Diebold AccuVote TSX voting unit.

BLANK VOTE (NO VOTE) – An instance when a voter did not make a selection for a candidate or issue that appeared on their ballot.

DRE – Direct Recording Electronic, a term used to describe voting equipment that allows a voter to select voting choices using a fully electronic interface – typically by touching a computer screen or pushing a button adjacent to a choice displayed on a screen.

ELECTION MANAGEMENT SYSTEM - A software program that enables election officials to design ballots, prepare reports and coordinate the operations of the voting equipment with the voter registration system.

EQUIPMENT CERTIFICATION - Laboratory evaluation of election equipment that may be performed at the national or state level. During the certification process equipment is scrutinized to verify its accuracy, reliability and security features. Georgia law requires that any election equipment placed in service in the state pass both national (FEC/NASED) and state certification (performed at Kennesaw State University).

FEC - Federal Election Commission, the federal agency responsible for a wide range of election-related matters. The FEC sets standards for the accuracy and functionality of voting equipment.

ITA -Independent Testing Agency, a laboratory approved by NASED to conduct intensive testing of election equipment, evaluating its accuracy, functionality, reliability and maintainability.

LOGIC AND ACCURACY TEST - A test performed on voting equipment before its use in an election to verify that it is working accurately and properly.

NASED - National Association of State Election Directors, responsible for administering and applying the standards for voting equipment accuracy and functionality set by the Federal Elections Commission.

POLLING LOCATION – Refers to a physical location in which a vote was cast.

POLLING PRECINCT – Refers to a physical location in which a vote was cast.

PRIMARY TALLY – The first count of the VVPAT ballots in the VVPAT manual audit process.

PROVISIONAL – Votes that are not counted until the voter’s eligibility has been verified by the voter’s county Board of Elections.

RECONCILED – In conducting a manual audit of the VVPAT vote totals, the term is used in a comparison of the VVPAT summary and its correlating audit tally sheet. The vote totals are considered “reconciled” if the vote totals match.

REJECTED – Term that refers to when a voter changes his/her mind and opted out of original decision to cast their ballot.

SECONDARY TALLY – The second count of the VVPAT ballots in the VVPAT manual audit process. It is only performed in the event that the primary tally totals did not match the VVPAT ballot totals.

SENATE BILL 500 - Legislation enacted by the 2006 Georgia General Assembly and signed into law by Governor Sonny Perdue on April 28, 2006. The legislation mandated that a pilot program be conducted during the November 7, 2006 General Election and the subsequent December 5, 2006 Runoff Election for the purpose of providing electronic voting systems that produce a permanent paper record of the votes recorded on such systems for each voter at one polling location in the counties of Bibb, Camden, and Cobb.

UNDERVOTE - The difference between the number of ballots cast and the number of votes recorded in an individual race. An undervote may be created when a voter deliberately chooses not to vote in a race, when a voter attempts to make a choice but makes an error that causes the vote not to be read, or when a voter makes a proper and valid choice but, because of mechanical or system failure, it is not read by the counting equipment.

VVPAT – Voter Verifiable Paper Audit Trail is an independent verification system for voting machines designed to assure voters that their vote was cast as intended. This is accomplished by the attachment of a printer to the voting machine that prints paper records stored within the machine.

VVPAT BALLOT COUNT – The manual count of each ballot printed on a VVPAT tape.

VVPAT CANISTER – A container that stores the VVPAT paper ballots. Identifying information is provided on the canister label.

VVPAT SUMMARY – The summary of voting activity on a particular Diebold AccuVote TSX voting unit. It is located at the end of the ballot tape.

APPENDIX A

The following documents are included in this section:

- **Senate Bill 500**
- **Senate Roll Call Vote**
- **House Roll Call Vote**

Senate Bill 500

By: Senators Stephens of the 27th, Wiles of the 37th, Staton of the 18th and Hill of the 32nd

AS PASSED

AN ACT

To provide a short title; to amend Part 5 of Article 9 of Chapter 2 of Title 21 of the Official Code of Georgia Annotated, relating to electronic recording voting systems, so as to provide for a pilot program during the 2006 November general election and any runoff therefrom in certain counties; to require that all electronic recording voting systems used in such pilot project produce a permanent paper record of the votes recorded on such systems for each voter; to provide that such voters have an opportunity to verify such record after voting; to provide for certain storage devices for such systems; to provide that such paper records be retained for use in recounts and election challenge proceedings; to provide for procedures for voting on such electronic recording voting systems; to provide for related matters; to provide for effective dates; to repeal conflicting laws; and for other purposes.

1 **BE IT ENACTED BY THE GENERAL ASSEMBLY OF GEORGIA:**

2 **SECTION 1.**

3 This Act shall be known and may be cited as the "2006 Georgia Accuracy in Elections Act."

4 **SECTION 2.**

5 Part 5 of Article 9 of Chapter 2 of Title 21 of the Official Code of Georgia Annotated,
6 relating to electronic recording voting systems, is amended by adding a new Code Section
7 21-2-379.12 to read as follows:

8 "21-2-379.12.

9 (a) The Secretary of State shall implement a pilot program providing for the use of direct
10 recording electronic (DRE) voting equipment equipped and configured with an elector
11 verified, permanent paper record of the votes cast by each elector on each DRE unit in one
12 precinct each in the Counties of Cobb, Bibb, and Camden in the 2006 November general
13 election and any runoff from such election.

14 (b)(1) Each DRE unit used in the pilot project shall meet the requirements of this
15 subsection and shall be of the same general type from the same vendor or manufacturer
16 as those DRE units in use in the state.

- 1 (2) Each DRE unit used by the counties in the pilot project shall have received national
2 qualification and shall have passed state certification for use in elections. For the
3 purposes of this Code section, the Secretary of State is authorized to provide for a
4 conditional certification of the units which shall expire on December 31, 2006.
- 5 (3) Each unit shall produce an elector verified, permanent paper record of the votes cast
6 by each elector on such device and shall provide the elector with an opportunity to review
7 the permanent paper record privately and independently before casting his or her vote on
8 the unit and to change his or her ballot or correct any error in such record or vote;
9 provided, however, that it shall not allow the elector to have actual physical possession
10 of such record. Each unit shall bear a unique identifying number and each unit shall be
11 equipped with a storage device that:
- 12 (A) Stores each of the elector verified, permanent paper records at the same time as
13 such elector's votes are stored electronically by the DRE unit;
- 14 (B) Bears the same unique identifying number as the DRE unit to which it is attached;
15 and
- 16 (C) Can be removed from the DRE unit for the purpose of transporting the permanent
17 paper records contained therein to a central tabulating center.
- 18 (c) In those counties constituting the pilot project in the 2006 November general election
19 and any runoff therefrom, each duly qualified elector shall cast his or her vote on a DRE
20 unit by touching the screen or pressing the appropriate button on the unit for the candidate
21 or issue of such elector's choice. After having the opportunity to vote in all races and upon
22 all questions in which the elector is eligible to vote, the unit shall display a summary of the
23 choices which the elector has made. At that time, the elector shall also be notified of any
24 races or questions in which the elector did not make a selection and all other choices of the
25 elector shall be displayed for the elector's review. The elector shall have the opportunity
26 to change any choices which the elector made in voting the ballot and be allowed to vote
27 in those races and on those questions in which the elector did not previously make a
28 selection or cast a vote, and the elector shall again be presented with a summary display of
29 his or her choices. After the summary screen is displayed and the elector desires to make
30 no further changes to his or her votes, the elector shall be notified that he or she is about
31 to cast the ballot. Prior to the elector casting his or her vote on the unit, the unit shall print
32 a permanent paper record of the elector's votes. The elector shall then review such
33 permanent paper record and, if such record is correct, the elector shall then press the
34 appropriate button on the unit or location on the screen to actually cast his or her ballot and

1 cause such votes to be recorded, which shall also cause the permanent paper record to be
2 deposited in a ballot box or other secure container. If the votes shown on the permanent
3 paper record are incorrect, the unit shall allow the elector to correct such error or errors by
4 rejecting and voiding the permanent paper record that was printed and changing such
5 elector's votes on the unit. After making such corrections, the unit shall print a new
6 permanent paper record for the elector's review. If the new record is correct, the elector
7 shall then press the appropriate button on the unit or location on the screen to actually cast
8 his or her ballot. If the new record is incorrect, the unit shall allow the voter to reject and
9 void the new permanent paper record and again change the elector's votes on the unit.
10 After making such corrections, the unit shall print a permanent paper record of the elector's
11 votes and shall cause the elector's ballot to be cast and such votes to be recorded. The
12 elector shall only be allowed to adjust his or her votes three times before casting the ballot.
13 After pressing the appropriate button on the unit or location on the screen to cast the ballot,
14 the elector's vote shall be final and shall not be subsequently altered. The permanent paper
15 records shall be secured in locked ballot boxes or other secure containers at all times and
16 such ballot boxes or containers shall not be opened nor shall such ballots be counted unless
17 and until required to be counted pursuant to a recount or an election contest proceeding;
18 provided, however, that the Secretary of State shall cause a complete manual audit to be
19 performed on each DRE unit used in the pilot project for voting within 30 days following
20 the 2006 November general election and within 30 days of any runoff of such election.
21 The audit shall compare the results of the permanent paper records from each DRE unit
22 with the electronic record recorded by the DRE unit. The results of such audits shall be
23 made available to the public upon the completion of the audits.
24 (d) The Secretary of State shall provide the DRE units and all necessary software, supplies,
25 training, and support for the pilot project.
26 (e) The State of Georgia shall provide the funding needed to implement such pilot project.
27 (f) Not later than the second Monday in January, 2007, the Secretary of State shall conduct
28 a public hearing in each of the pilot areas. A summary of the findings as well as the
29 comments received shall be submitted to the General Assembly and made available to the
30 general public.
31 (g) This Code section shall be repealed by operation of law on February 1, 2007."

32 **SECTION 3.**

- 1 This Act shall become effective upon its approval by the Governor or upon its becoming law
- 2 without such approval.

3 **SECTION 4.**

- 4 All laws and parts of laws in conflict with this Act are repealed.



SB 500

PASSAGE BY SUBSTITUTE

MARCH 06, 2006
11:35 AM

Yea (Y): 51 Nay (N): 0 Not Voting (-): 0 Excused (E): 5

Y	ADELMAN, 42ND	Y	HILL, JACK, 4TH	Y	SMITH, 52ND
Y	BALFOUR, 9TH	Y	HILL, JUDSON, 32ND	Y	STARR, 44TH
Y	BROWN, 26TH	Y	HOOKS, 14TH	Y	STATON, 18TH
Y	BULLOCH, 11TH	Y	HUDGENS, 47TH	Y	STEPHENS, 27TH
Y	BUTLER, 55TH	E	JOHNSON, 1ST	Y	STONER, 6TH
Y	CAGLE, 49TH	Y	JONES, 10TH	Y	TARVER, 22ND
Y	CARTER, 13TH	Y	KEMP, 46TH	Y	TATE, 38TH
Y	CHANCE, 16TH	Y	ME V BREMEN, 12TH	Y	THOMAS, D, 54TH
Y	CHAPMAN, 3RD	Y	MILES, 43RD	Y	THOMAS, R, 2ND
Y	DOUGLAS, 17TH	Y	MOODY, 56TH	Y	THOMPSON, C, 5TH
Y	FORT, 39TH	Y	MULLIS, 53RD	E	THOMPSON, S, 33RD
E	GOGGANS, 7TH	Y	PEARSON, 51ST	Y	TOLLESON, 20TH
Y	GOLDEN, 8TH	Y	POWELL, 23RD	Y	UNTERMAN, 45TH
Y	GRANT, 25TH	Y	REED, 35TH	Y	WEBER, 40TH
Y	HAMRICK, 30TH	Y	ROGERS, 21ST	Y	WHITEHEAD, 24TH
E	HARBISON, 15TH	Y	SCHAEFER, 50TH	Y	WILES, 37TH
Y	HARP, 29TH	Y	SEABAUGH, 28TH	Y	WILLIAMS, 19TH
Y	HEATH, 31ST	Y	SEAY, 34TH	E	ZAMARRIPA, 36TH
Y	HENSON, 41ST	Y	SHAFFER, D, 48TH		

Yea (Y): 160 Nay (N): 0 Not Voting (-): 16 Excused (E): 4

Y	ABDUL-SALAAM, 74TH	Y	GRAVES, D, 137TH	Y	MOSLEY, 178TH
Y	AMERSON, 9TH	-	GRAVES, T, 12TH	Y	MUMFORD, 95TH
-	ANDERSON, 123RD	E	GREENE, 149TH	Y	MURPHY, J, 23RD
Y	ASHE, 56TH	Y	HANNER, 148TH	Y	MURPHY, Q, 120TH
Y	BARNARD, 166TH	Y	HARBIN, 118TH	Y	NEAL, 1ST
Y	BARNES, 78TH	Y	HATFIELD, 177TH	Y	O'NEAL, 146TH
Y	BEARDEN, 68TH	Y	HEARD, J, 104TH	Y	OLIVER, 83RD
-	BEASLEY-TEAGUE, 65TH	Y	HEARD, K, 114TH	Y	ORROCK, 58TH
Y	BENFIELD, 85TH	E	HECKSTALL, 62ND	Y	PARHAM, 141ST
Y	BENTON, 31ST	Y	HEMBREE, 67TH	Y	PARRISH, 156TH
Y	BLACK, 174TH	Y	HENSON, 87TH	Y	PARSONS, 42ND
Y	BORDEAUX, 162ND	Y	HILL, C, 21ST	Y	PORTER, 143RD
Y	BORDERS, 175TH	Y	HILL, C.A, 180TH	Y	POWELL, 29TH
Y	BRIDGES, 10TH	Y	HOLMES, 61ST	Y	RALSTON, 7TH
Y	BROOKS, 63RD	Y	HOLT, 112TH	Y	RANDALL, 138TH
Y	BROWN, 69TH	Y	HORNE, 71ST	Y	RAY, 136TH
Y	BRUCE, 64TH	Y	HOUSTON, 170TH	Y	REECE, B, 11TH
Y	BRYANT, 160TH	Y	HOWARD, E, 121ST	Y	REECE, S, 27TH
Y	BUCKNER, D, 130TH	Y	HUDSON, 124TH	Y	REESE, 98TH
Y	BUCKNER, G, 76TH	Y	HUGLEY, 133RD	Y	RICE, 51ST
-	BURKHALTER, 50TH	Y	JACKSON, 161ST	-	RICHARDSON, 19TH
Y	BURMEISTER, 119TH	Y	JACOBS, 80TH	Y	ROBERTS, 154TH
Y	BURNS, 157TH	Y	JAMES, 135TH	Y	ROGERS, 26TH
E	BUTLER, 18TH	Y	JAMIESON, 28TH	Y	ROYAL, 171ST
Y	BYRD, 20TH	Y	JENKINS, 8TH	Y	RYNDERS, 152ND
Y	CARTER, 159TH	Y	JENNINGS, 82ND	Y	SAILOR, 93RD
Y	CASAS, 103RD	Y	JOHNSON, 37TH	Y	SCHEID, 22ND
Y	CHAMBERS, 81ST	Y	JONES, J, 46TH	Y	SCOTT, A, 153RD
Y	CHANNELL, 116TH	Y	JONES, S, 44TH	Y	SCOTT, M, 2ND
Y	CHEOKAS, 134TH	Y	JORDAN, 77TH	Y	SETZLER, 35TH
Y	COAN, 101ST	Y	KEEN, 179TH	-	SHAW, 176TH
Y	COLE, 125TH	Y	KEOWN, 173RD	Y	SHELDON, 105TH
-	COLEMAN, B, 97TH	Y	KIDD, 115TH	Y	SIMS, C, 169TH
Y	COLEMAN, T, 144TH	Y	KNIGHT, 126TH	Y	SIMS, F, 151ST
Y	COOPER, 41ST	Y	KNOX, 24TH	Y	SINKFIELD, 60TH
Y	COX, 102ND	Y	LAKLY, 72ND	Y	SMITH, B, 113TH
-	CRAWFORD, 127TH	Y	LANE, B, 158TH	Y	SMITH, L, 70TH
Y	CUMMINGS, 16TH	Y	LANE, R, 167TH	Y	SMITH, P, 13TH
Y	DAVIS, 109TH	Y	LEWIS, 15TH	Y	SMITH, R, 131ST
Y	DAY, 163RD	Y	LINDSEY, 54TH	Y	SMITH, T, 168TH
Y	DEAN, 59TH	Y	LORD, 142ND	Y	SMITH, V, 129TH
Y	DICKSON, 6TH	Y	LOUDERMILK, 14TH	Y	SMYRE, 132ND
Y	DODSON, 75TH	Y	LUCAS, 139TH	Y	STANLEY-TURNER, 53RD
E	DOLLAR, 45TH	-	LUNSFORD, 110TH	Y	STEPHENS, 164TH
Y	DRENNER, 86TH	Y	MADDOX, 172ND	Y	STEPHENSON, 92ND
Y	DUKES, 150TH	Y	MANGHAM, 94TH	Y	TALTON, 145TH
Y	EHRHART, 36TH	Y	MANNING, 32ND	Y	TEILHET, 40TH

Y	ENGLAND, 108TH	Y	MARIN, 96TH	Y	THOMAS, B, 100TH
Y	EPPS, 128TH	Y	MARTIN, 47TH	Y	THOMAS, A.M, 55TH
Y	EVERSON, 106TH	-	MAXWELL, 17TH	-	TUMLIN, 38TH
Y	FLEMING, 117TH	Y	MAY, 111TH	Y	WALKER, 107TH
Y	FLOYD, H, 99TH	-	MCCALL, 30TH	Y	WARREN, 122ND
Y	FLOYD, J, 147TH	-	MCCLINTON, 84TH	-	WATSON, 91ST
Y	FLUDD, 66TH	Y	MEADOWS, 5TH	Y	WILKINSON, 52ND
-	FORSTER, 3RD	Y	MILLAR, 79TH	Y	WILLARD, 49TH
Y	FRANKLIN, 43RD	Y	MILLS, 25TH	Y	WILLIAMS, A, 165TH
Y	FREEMAN, 140TH	-	MITCHELL, 88TH	Y	WILLIAMS, E, 89TH
Y	GARDNER, 57TH	Y	MORGAN, 39TH	Y	WILLIAMS, R, 4TH
Y	GEISINGER, 48TH	Y	MORRIS, 155TH	Y	WIX, 33RD
Y	GOLICK, 34TH	Y	MOSBY, 90TH	Y	YATES, 73RD

APPENDIX B

The following documents are included in this section:

- **Manual Observation Report Bibb County**
- **Manual Observation Report Camden County**
- **Manual Observation Report Cobb County**

Bibb County VVPAT Pilot Audit Observation Report

- 1) There were two (2) Democrat, two (2) Republican, and four (4) Non-partisan appointees which made up the teams for the manual audit. The Non-partisan appointees consisted of poll managers/workers and a technician.
- 2) It took a total of 3 ½ days to complete the audit. The morning of the first day of the audit there were three (3) teams made up of one Republican, one Democrat and one Non-partisan member.
- 3) On the third day they were broken down into two (2) three-member teams and one (1) two-member team.
- 4) The start time on the first day was approximately 9:30 AM. Multiple rooms were used. There was a table, chairs, pens, pencils, and tally sheets provided to each team along with a canister.
- 5) It took approximately 3 ½ hours to complete the audit on the first canister. The length of time for subsequent canisters varied according to the number of ballots and break time. One team consisted of the two youngest team members. This team was quicker and more accurate with their count than the other two teams, and was the only team to produce an accurate count on a canister.
- 6) The number of members on each team was altered twice. The reason for this was to test different methods for future use if necessary. I would recommend three (3) member teams with one member calling the candidate name and two members recording. There should be comparisons made of the two tallies after 10 or 20 names have been called to check for accuracy.
- 7) Bibb County had eight (8) canisters. There were three (3) tallies completed on 7 canisters and two (2) tallies completed on one. On the fourth day Ms. Gail Whitehead from Chatham County worked with my teams in completing the third audit of each canister.
- 8) A possible reason for the canisters not tallying after the second count was mainly contributed to the fact that no long tape was printed on election night. Other factors were caller mistakes, recorder mistakes, distractions, and rejected ballots.
- 9) Overall experience was very stressful and very time consuming. I was not sure how much assistance should be provided by me in helping the teams tally the votes. The purpose of this test pilot was to see how time consuming and accurate a human count of the audit trail would be in the future if law was passed for it to be implemented. One of the main concerns voters seem to have voiced is that an election official can manipulate the memory card in some way changing how the vote is counted. Having assistance from outside my county on the fourth day making sure the paper audit trail matched the memory card count eased my

mind; for now no voter in Bibb County can say that I tampered with the paper audit trail in any way to make sure it matched the memory card records.

- 10) If the procedure could be changed two (2) people should be tallying at all times, change the wording "No Vote Cast" to "Not Cast", and if referendums/amendments are on the ballot they should be distinguished somehow on the tally tape. All races should be counted on the Primary Tally and only the races that were not correct on the Primary Tally should be checked on the Secondary Tally by a different team.
- 11) The VVPAT technology is accurate but not poll worker friendly. There were two techs at my precinct on election morning that were very familiar with the assembly of the unit and it took them one whole hour to set the units up and have them ready for the voters. This would be an almost impossible task for the elderly poll workers on election morning with all the other things they have to do to be prepared for the voters at 7:00 AM.
- 12) A county wide audit of VVPAT units is not feasible or cost efficient. It would put a burden on the counties to pay additional workers and would prolong any recount necessary placing undue pressure on the candidates involved. On November 7, 2006 275 voting units were used in Bibb County. If the same number of teams were used it would take approximately 103 days to hand count the canisters from 275 units used in a primary or general election. (8 units x 3 hours = 24 hours; 275 units x 3 hours = 825 hours; 825 hours ÷ 8 hours a day = 103 days.)

Camden County VVPAT Pilot Audit Observation Report

The audit began on November 16 about 9:00 am with Mr. Don Williams, one of the audit team members, instructing the group on the procedures to be followed. Then, they divided into two teams and began the process. The first two canisters that were opened were continuation tapes from the two machines requiring tape changes on Election Day. We could not verify the totals from this audit until we audited the first canister from these two machines. The process was quite slow on these two tapes since they were learning how to progress through the audit process. However, we were able to clear up some questions from both teams as they progressed through these tapes.

As the day went on and throughout the next day, the audit went fairly smoothly. As we verified the tally sheets to the results tapes printed on Election Day, we found that there were some races that did not exhibit the same totals. When this occurred, that team would pass the tape to the opposite team, and they would audit those races with discrepancies. We followed this process until we were able to verify the results from the printed results tapes. The teams found that the main cause for these discrepancies were rejected ballots being tallied as voted ballots. Another area that caused some question was cancelled ballots. It was determined that the cancelled ballot did not print any ballot choices, and therefore, did not require any action.

The audit process in Camden County found that the manual tally was able to verify the totals printed on the results tapes for each unit. While this process sometimes required multiple audits, it was determined that the totals produced from both the VVPAT and those determined from the upload of results from the unit's memory card were the same.

Rejected instructions should be expanded to include cancelled ballots. Procedures for counting jammed ballots should be included in the procedures for conducting the audit. In some instances, part of the ballot could be verified while a portion was illegible. We were unclear on whether to account for those votes that were able to be determined or not count any votes cast on that ballot. One member of the team pointed out that by not being able to verify the last portion of the ballot, you could not be certain whether the ballot was cast or rejected. When I contacted the State Election Office, we were instructed not to count any votes cast on a jammed ballot. We did, however, tally the number of jammed ballots on each tape on the top portion of the audit tally sheet. In all cases, we were able to determine that the count discrepancies correlated with the number of jammed ballots for that particular tape. This was a time consuming process that they felt should or could be handled more efficiently.

Cobb County, Georgia

Pilot Project

Voter Verifiable Paper Audit Trail

November 7, 2006

Sharon Dunn, Director of Elections
December 21, 2006

Cobb County VVPAT Pilot Audit Observation Report

I. The Pilot Precinct

The precinct chosen for the pilot was Macland 01, which votes at McEachern Memorial United Methodist Church, 4075 Macland Rd., Powder Springs, GA 30127.

Voter Registration Statistics as of November 1, 2006

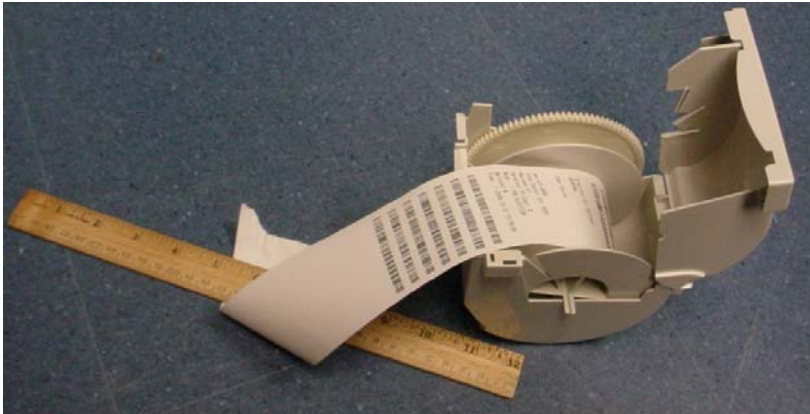
	Black	White	Asia-PI	Hisp-Lt	Other	Total
Active	866	1209	19	45	88	2,227
Inactive	115	169	0	3	12	299
TOTAL	981	1378	19	48	100	2,526
%	38.8%	54.6%	0.8%	1.9%	4.0%	100%
County Total %	21.6%	72.0%	1.5%	1.6%	3.4%	100%

The precinct was chosen based on voter registration statistics, the capabilities of the poll workers, the location's suitability for the pilot equipment, and the location's suitability and availability for conducting the public hearing.

II. The Canisters

The voter verifiable paper audit trail (VVPAT) is created by attaching a special printer module (AVPM) to a Diebold TSX machine. When a voter completes the last race on his ballot and touches "Next", the screen then displays a summary of all the races on that ballot. Before he can cast his ballot, the voter must touch the "Print Ballot" button in the lower right hand corner of the screen. The printer prints a record of the voter's choices which the voter verifies as being correct. For the General Election ballot in this precinct, the voter had to press "Print Ballot", and then "Print Next Page" 4 times. When the voter presses "Cast Ballot", the paper trail is rolled up into the secure canister and blank paper is displayed for the next voter.

Originally 8 TSX - AVPM units were deployed to the pilot precinct. Based on mounting



lines during the morning, an additional unit was deployed to the precinct at 3:00pm. Each of the original 8 units used 2 canisters, and the 9th unit used 1 canister for a total of 17 canisters. Attaching the AVPM unit to the TSX machine required an additional 20 steps to the current poll worker opening procedures for the poll workers before the polls

could open on Election Day. Because of the difficulty of those procedures, a technician from Diebold was present with them all day at the poll. When the paper ran out in a canister during the day, the canister had to be removed and secured and a new canister installed in that printer. That took time away from voters being able to vote on each unit, and increased the lines at this precinct.

An open canister with paper tape

Each canister had a label on the outside to prove the chain of custody and to track which TSX machine the canister was used in. (See sample below.) The canisters were each numbered, but there is no relationship between the numbers on the canisters and the order in which they were used.

COBB COUNTY

Nov 7, 2006 Vote Center # 033122

TSX Serial # 0287215

Canister # 10 of 17

Signatures:

Theresa Harris

Eleanor Rainey

Matthew J. Casey

Seal # 11182

The length of the paper roll inside each canister varied greatly. The same paper rolls were used for testing, training, and then on Election Day; some had been used up more in testing and were therefore smaller than others by Election Day. The chart (above) lists each canister and how many ballots it contained.

GENERAL Cobb County
Maclean 01

For Governor
[X] SONNY PERDUE (NP)

For Lieutenant Governor
[X] CASEY CAGLE Republican (NP)

For Secretary of State
[X] KAREN HANDEL Republican (NP)

For Attorney General
[X] PERRY MCQUISE Republican (NP)

For Commissioner of Agriculture...
[X] GARY BLACK Republican (NP)

For Commissioner of Insurance
[X] JOHN W. DICKINSON (NP)

For State School Superintendent...
[X] KATHY COX (NP)

For Commissioner of Labor
[X] BRENT BROWN Republican (NP)

For Public Service Commission...
[X] CHUCK EATON Republican (NP)

For Public Service Commission...
[X] STAN WISE (NP)

For U.S. Representative in th...
[X] DEBORAH TRAVIS HONEYCUTT (NP)

For State Senator From the 33...
[X] MARK T. GRANT Republican (NP)

For State Representative in L...
[X] DON WIK (NP)

For Solicitor-General
[X] BARRY E. MORGAN (NP)

For Justice, Supreme Court of...
[X] GEORGE M. CARLEY (NP)

For Justice, Supreme Court of...
[X] CAROL W. HUNSTEIN (NP)

For Justice, Supreme Court of...
[X] HAROLD D. NELTON (NP)

For Justice, Supreme Court of...
[X] HUGH P. THOMPSON (NP)

For Judge, Court of Appeals o...
[X] JOHN ELLINGTON (NP)

For Judge, Court of
[X] R. YVETTE MILL (NP)

For Judge, Court of Appeals o...
[X] HERBERT E. PHIPPS (NP)

For Judge, Court of Appeals o...
[X] J.D. SMITH (NP)

For Judge, Superior Court of ...
[X] JIM BODIFORD (NP)

For Judge, Superior Court of ...
[X] ROBERT E. FLOURNOY (NP)

For Judge, Superior Court of ...
[X] JOHN P. DAVIS (NP)

For Judge of State Court of C...
[X] DAVID P. DARGEN (NP)

For Judge of State Court of C...
[X] BEVERLY COLLINS (NP)

For Judge of State Court of C...
[X] NANCY M. CAMPBELL (NP)

For Judge of State Court of C...
[X] MARIA COLTICK (NP)

For Judge of State Court of C...
[X] BRIDGETTE CAMPBELL (NP)

For Judge of State Court of C...
[X] CARL W. BOWERS (NP)

For Cobb County Soil and Water...
[X] DONALD AINES (NP)

[X] ALICE CHAMPAGNE (NP)

[X] FRED WOOD SNELL, III (NP)

-1- TO RESTRICT THE USE OF EN...
[X] YES (NP)

-2- TO PROTECT THE TRADITIONS...
[X] YES (NP)

-3- TO AUTHORIZE THE GENERAL ...
[X] YES (NP)

-4- TO EXPAND THE AD VALOREM ...
[X] YES (NP)

-5- TO EXPAND THE AD VALOREM ...
[X] YES (NP)

-6- TO EXPAND THE AD VALOREM ...
[X] YES (NP)

-7- TO PROVIDE A HOMESTEAD EX...
[X] YES (NP)

-8- TO PROVIDE A HOMESTEAD EX...
[X] YES (NP)

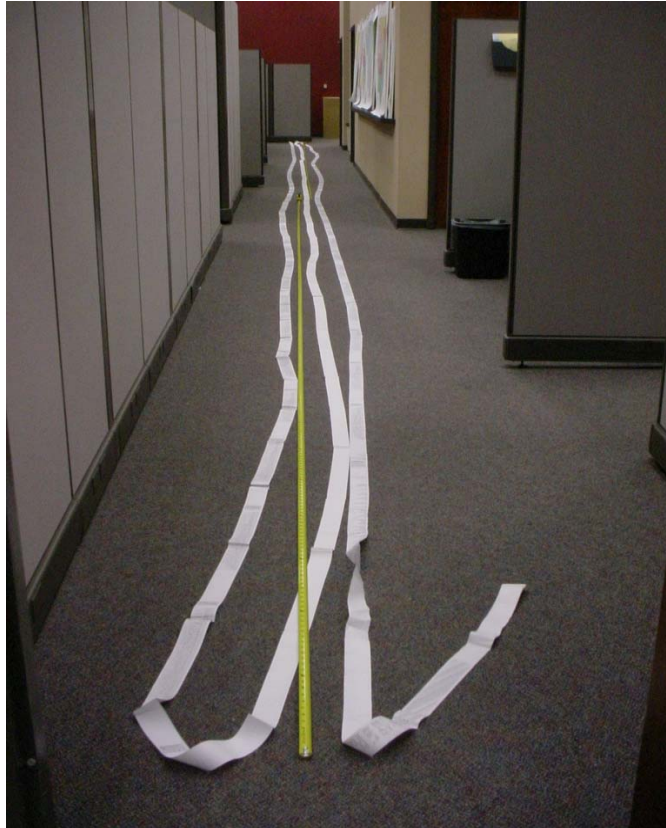
-9- TO PROVIDE THAT A SURVIV...
[X] YES (NP)

PARKS BOND REFERENDUM
[X] YES (NP)

The ballot in the pilot precinct contained 42 races. The first 14 were partisan races for candidates, the next 18 were nonpartisan races for candidates, and the final 10 were questions. On the VVPAT, the race is identified by the first 30 characters of its title.

(See Sample left, which is 80% scale.)
It took approximately 10 inches of paper tape to print each voter's ballot. There is approximately 2 inches of blank space between

the end of one ballot and the beginning of the next. The paper tape therefore contains 1 ½ feet of tape per voter. There were 976 voters, so there are approximately 1464 feet of paper tape for the printing of all of the ballots cast at this precinct. There is also a results tape at the beginning of the first canister for each TSX machine and the end of the last canister for each TSX machine. This adds several more feet to the length of the tapes. The total length of paper tapes if stretched out end to end would run through more than 5 football fields. These tapes were very unwieldy to handle, and a lot of time was spent unwinding and untwisting them as the manual count work progressed. As they were completed they were folded rather than rewound.



**One complete VVPAT tape placed along the Cobb County Election Office floor.
Approximately 194 feet long (95 ballots)**



An Unwound Tape

A Tape In Progress—Being Folded As It Is Completed

III. The Manual Audit Teams

A. How we chose them

The first decision we made was to invite the Poll Manager to be part of the counting teams. If any questions were to arise about what occurred at the poll during the Election Day, she would be available to provide the information. The Diebold technician was also present for much of the counting, although he did not serve on a team. Besides the poll manager, we used workers who were already on our payroll, were capable of doing the work, were available on the days needed, and were not doing other work that was deadline oriented.

B. First Day

We decided to begin with 4 teams of three people each at 9:30am on November 16th. Present on the first day were 12 employees, 3 managers, and the Diebold technician.

C. Subsequent Days

At the end of the first day, we did not feel that sufficient progress had been made to complete the task in the allotted 5 days, so we formed 2 additional teams for the second day. However, needing 18 people each day, we were not able to get all of the same people for complete days, so while each team always had three members, the membership of the teams changed considerably on days 2 through 5.

IV. The Space

The main auditing room is approximately 400 sq. ft. On the first day, there were four audit team tables measuring 2 x 4 feet, each with three chairs. A fifth table, used to hold supplies, was placed in one corner of the room. An observation area was set up along one wall with approximately 7 - 8 chairs.

Each Audit Team consisted of a Caller and two Recorders. The Caller sat at the short end of the table and the Recorders sat on the long sides of the table opposite each other.

After the first day, two additional audit team tables were added and dividers were moved in to separate the teams. The dividers were used to block the sound carrying from team to team and consisted of various racks of equipment and supplies. The noise was a definite problem as several callers would call out the same candidates' names in succession. The supply table was moved to the center of the room. The observation area was dismantled.

A second room of approximately 155 sq. ft. was used to reconcile the audit tally counts to the Touch Screen tapes. Two people worked across a single table in this room. Any tallies that were found not to match the tape were sent back to the primary room for recounting.



A Team Working

A. Errors

Because the “tallying” method is so methodical and careful to begin with, we did not anticipate the number of errors that occurred. We believed that the process would work to keep the 2 recorders together, but it did not. It was impossible for any of the employees to get all the way through one canister without making some errors in tallying some races. It takes only a fraction of a second’s lapse of concentration to make an error. Therefore, there were multiple “Restarts” by each team when they had to go back and redo one race that they did not agree on. A higher number of ballots per tape tended to make it harder to tally correctly the first time, but the biggest determinant turned out to be the capability of the individual employees. Some team members had to be swapped out to other teams or replaced altogether before we could get a correct tally.

V. Results

All manual tallies matched the machine counts, thus proving that the machine counts were correct. However, the cost, as measured in both time and money, was high.

A. Total employee hours and cost

A total of 24 different employees, 3 managers, and the Diebold technician were used during the course of the 5 days. The total cost was \$2,937.45 not including the three managers or the Diebold technician (whose salary was paid by Diebold.) The following shows the number of teams and hours worked each day.

B. Time per Ballot

In analyzing the counting time per canister, the time required to count one ballot varied from 3 minutes to 11 minutes, with an overall average of 5 minutes per ballot. The time

required per ballot seems to be determined by a variety of factors working together; therefore, it is not predictable. There does not seem to be a “learning curve” where the first canister done by a team took longer than subsequent canisters.

For example, the canisters with fewer ballots seemed to be easier to count, however, in the 7 canisters that contained less than 50 ballots, the per-ballot time ranged from 3 minutes to 9 minutes. In the 6 canisters that contained over 80 ballots each, the time per ballot ranged from 4 minutes to 11 minutes. The largest canister contained 104 ballots and it took 5 minutes per ballot to count.

The capability of the teams seems to be a slightly better predictor of success. For example, the “fastest” team had an average of 2 minutes per ballot. On the other hand, the “slowest” team had an average of 10 minutes per ballot. They seemed to be having trouble from the start, so we changed the personnel several times. It is not clear if changing the personnel was a cause or an effect; perhaps changing the personnel made it even harder for the group to get into a routine of working well together.

Within each team there was a large range of minutes per ballot. For example, Team # 4 varied from less than a minute per ballot to 4 minutes per ballot. The lower average time per ballot did not result from working faster, but from being careful, so that fewer mistakes were made, and the ones that were made were caught earlier. In the original counts, where the teams were counting all 42 races on each ballot, the time ranges from 2 to 11 minutes per ballot. When the teams were doing recounts, which were usually only a few races per tape, the time ranges from less than a minute per ballot to 3 minutes per ballot.

Table of the Amount of Time Required to Perform Manual Count

Event	Canister #	Elapsed Time	Number of Ballots per Canister	Minutes per Ballot per Canister	TSX Machine ID#	Number of Ballots per TSX	Minutes per Ballot per TSX
Original Count Canister	9	1:46	13	9	0	97	7
Recounts Canister	9	0:10					
Total Canister	9	1:56					
Original Count Canister	10	5:57	84	6	0	97	7
Recounts Canister	10	2:43					
Total Canister	10	8:40					
Total TSX Machine ID		10:36					
Original Count Canister	8	1:20	18	5	1	113	4
Recounts Canister	8	0:01					
Total Canister	8	1:21					
Original Count Canister	17	6:16	95	4	1	113	4
Recounts Canister	17	0:16					
Total Canister	17	6:32					
Total TSX Machine ID		7:53					
Original Count Canister	5	1:53	41	3	2	41	3
Total Canister	5	1:53					
Total TSX Machine ID		1:53					
Original Count Canister	7	1:14	30	4	3	118	9
Recounts Canister	7	0:43					
Total Canister	7	1:57					
Original Count Canister	11	13:06	88	11	3	118	9
Recounts Canister	11	3:33					
Total Canister	11	16:39					
Total TSX Machine ID		18:36					
Original Count Canister	6	2:46	53	3	4	120	4
Recounts Canister	6	:10					
Total Canister	6	2:56					
Original Count Canister	15	3:54	67	4	4	120	4
Recounts Canister	15	0:53					
Total Canister	15	4:47					
Total TSX Machine ID		7:43					
Original Count Canister	1	1:27	20	4	5	124	5
Total Canister	1	1:27					
Original Count Canister	16	8:15	104	5	5	124	5
Recounts Canister	16	1:05					
Total Canister	16	9:20					
Total TSX Machine ID		10:47					
Original Count Canister	2	2:41	52	3	6	117	4
Total Canister	2	2:41					
Original Count Canister	13	4:01	65	4	6	117	4
Recount Canister	13	0:33					
Total Canister	13	4:34					
Total TSX Machine ID		7:15					
Original Count Canister	4	1:35	31	3	7	121	5
Recounts Canister	4	0:05					
Total Canister	4	1:40					
Original Count Canister	14	7:34	90	5	7	121	5
Recounts Canister	14	0:10					
Total Canister	14	7:44					
Total TSX Machine ID		9:24					
Original Count Canister	3	2:35	39	4	8	125	4
Total Canister	3	2:35					
Original Count Canister	12	4:58	86	4	8	125	4
Recounts Canister	12	0:38					
Total Canister	12	5:36					
Total TSX Machine ID		8:11					
TOTALS		82:18	976			976	5

C. *Restarts vs. Recounts*

When a team realized that the two recorders were not agreeing with each other, they had to immediately count that race over from the beginning of the tape. We termed this event a “Restart”. At the beginning, we did not ask the teams to keep track of these Restarts. Once we asked them to start keeping track, only 1 team, Team #4, did a good job of recording their Restarts. Below is a sample Event Log of one canister that they worked on. The canister contained 39 ballots and took them 2 hours and 35 minutes total, during 2 different work days. They made 5 restarts during that time period.

MANUAL AUDIT EVENT LOG - MACLAND 01
GENERAL ELECTION - NOVEMBER 7, 2006
Working Time Only

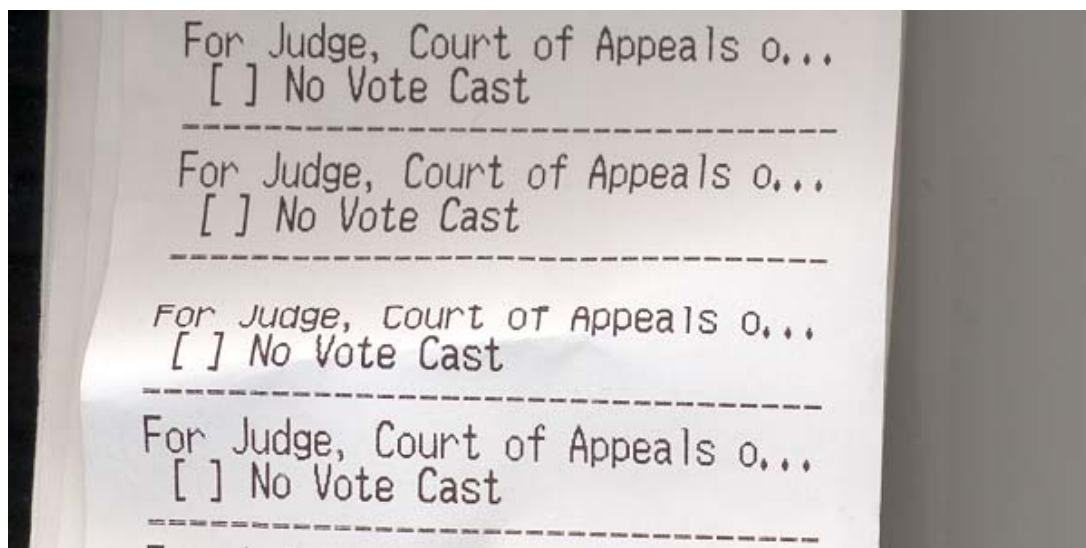
Table #	Sheet #	Event	Date	Begin Time	TSX Machine ID #	TSX Serial #	Canister #	Canister Serial #	End Time	Elapsed Time	Initials
4	c	Unseal canister	11/17/06	4:05 PM	8	297333	3	22054	4:10 PM	0:05	SF
4	c	Unroll tape to get to beginning	11/17/06	4:10 PM	8	297333	3	22054	4:15 PM	0:05	SF
4	c	Tally Ballots	11/17/06	4:15 PM	8	297333	3	22054	4:50 PM	0:35	SF
4	c	Restart	11/17/06	4:50 PM	8	297333	3	22054	4:55 PM	0:05	SF
4	c	Tally Ballots	11/17/06	4:55 PM	8	297333	3	22054	5:00 PM	0:05	SF
4	c	Tally Ballots	11/20/06	9:00 AM	8	297333	3	22054	9:20 AM	0:20	SF
4	c	Restart	11/20/06	9:20 AM	8	297333	3	22054	9:30 AM	0:10	SF
4	d	Tally Ballots	11/20/06	9:30 AM	8	297333	3	22054	9:40 AM	0:10	SF
4	d	Restart	11/20/06	9:40 AM	8	297333	3	22054	9:45 AM	0:05	SF
4	d	Restart	11/20/06	9:45 AM	8	297333	3	22054	9:50 AM	0:05	SF
4	d	Tally Ballots	11/20/06	9:50 AM	8	297333	3	22054	10:00 AM	0:10	SF
4	d	Tally Ballots	11/20/06	10:05 AM	8	297333	3	22054	10:30 AM	0:25	SF
4	d	Restart	11/20/06	10:30 AM	8	297333	3	22054	10:35 AM	0:05	SF
4	d	Turn in completed Tape	11/20/06	10:35 AM	8	297333	3	22054	10:45 AM	0:10	SF

After completion by the team, each set of tally sheets was checked by a manager. If it was determined not to be in balance, or not to match the results tape, it was given to another team to be recounted. The recounts are correctly recorded for all teams and canisters. A total of exactly 11 hours was spent on “Recounts”.

VI. What We Learned

A. *Diebold—the tape*

Because of the way the races displayed on the tapes, the employees got incredibly confused when calling and tallying the nonpartisan judges’ races. Several races in a row all have the same title except for “To succeed.....”. Because the tape is displaying only the first 30 characters, the part that differentiates one race from the next is not displayed. If employees were working on a ballot where the voter had made a selection, it was easy to distinguish the race by the candidate selected. But when employees were working on a ballot where the voter had not selected a candidate, every race would display “No Vote Cast”; therefore, there were several races in a row that appeared to be exactly the same and there was no way for the caller and recorders to know if they were talking about the same race.



The jurisdiction needs to have some control over how the race displays on the VVPAT tape. Rather than printing the first 30 characters of the race, the VVPAT tape could display the “Label” of the race, which is a shorter version that appears on the optical scan tapes and reports. For example, the “Labels” of the four judges’ races displayed in the sample above would have been “Appeals - Ellington”, “Appeals - Miller”, “Appeals - Phipps”, and “Appeals - Smith”, thus easily allowing the employees to differentiate between them.

B. The Process

We had a desire at the beginning to get all of the canisters with large numbers of ballots started to be sure that we could complete the task in the allotted time. However, we could not actually compare the counts to the results tapes until we had done all the canisters that belong to one machine. In retrospect, instead of using 4 teams to start 4 large tapes, we should have started the first and second tape for two machines.

One big problem with the current audit format was having to tally all of the races on every ballot. Although the ballot in the pilot precinct contained 27 races with opposition, there were also 15 races with unopposed candidates. Many times when a team made a mistake and had to restart, or when the tally sheets did not match machine totals and had to be recounted, the error was in a race for an unopposed candidate. For example, on day 4, one team spent 20 minutes recounting one of the unopposed races.

On several canisters, an error was made by not counting the right number of ballots. The votes can never total correctly if the auditors have skipped a ballot. For this reason, in the future we will number each ballot on the tape, and a manager will verify that the number of ballots to be counted matches the number of ballots cast on the machines before the employees proceed to tally the votes.

As soon as the General Election was over, we found out that we would be having a Runoff on December 5th. Many staff members had duties relating to preparing for the Runoff. In Cobb County there was only one race, and the turnouts for Absentee, Advance Voting and Election Day turned out to be low. However, if we were preparing for a large Runoff, such as we experienced on August 8, 2006, having to also conduct a manual audit of the previous election would have been a huge burden.

C. *Cancelled vs. Rejected Ballots*

We were familiar with the situation of a “Rejected” ballot where the voter had decided he was not happy with the results and went back to change some selections before casting the ballot. As in the sample on the next page, the ballot has printed on the tape, but when the auditors see the “Rejected” notation, they must cross out the preceding ballot and not count it.

Prior to beginning the audit we were not familiar with the possibility of the notation “Ballot Cancelled”. When it appeared on one of the first tapes to be audited, we assumed that it was similar to “Rejected” and directed the teams to cross out the preceding ballot and not count it. This turned out to be wrong. The totals from the tapes containing that notation did not match the machine totals on the first check because we had not counted the ballot prior to the “Ballot Cancelled” notation. We then did some testing on the extra TSX unit in our office and discovered that the reference “Ballot Cancelled” is printed on the tape when a ballot is cancelled prior to anything being printed. We should not have crossed out the ballots prior to the “Ballot Cancelled” notations, so we had to go back and count them.

14 ✓

GENERAL Cobb County
Macland 01

11

For Governor
[X] MARK TAYLOR Democrat <NP>

For Lieutenant Governor
[X] JIM MARTIN Democrat <NP>

For Secretary of State
[X] GAIL BUCKNER Democrat <NP>

For Attorney General
[X] THURBERT BAKER <NP>

For Commissioner of Agricultu...
[X] TOMMY IRVIN <NP>

For Commissio
[X] GUY DR
[X] NANCY M. CHANCE

For State S
[X] DENIS
For Judge of State Court of C...
[X] MARIA GOLICK <NP>

For Commis
[X] MIC
For Judge of State Court of C...
[X] BRIDGETTE CAMPBELL <NP>

For Publ
[X] D/
For Judge of State Court of C...
[X] CARL W. BOWERS <NP>

For Pul
[X]
For Cobb County Soil and Wate...
[X] ALICE CHAMPAGNE <NP>
[] No Vote Cast
[] No Vote Cast

For L
[X]
-1- TO RESTRICT THE USE OF EM...
[X] YES <NP>

For D
[X]
-2- TO PROTECT THE TRADITIONS...
[X] YES <NP>

For
[X]
-3- TO AUTHORIZE THE GENERAL ...
[X] YES <NP>

For
[X]
-A- TO EXPAND THE AD VALOREM ...
[X] NO <NP>

For
[X]
-B- TO EXPAND THE AD VALOREM ...
[X] YES <NP>

For
[X]
-C- TO EXPAND THE AD VALOREM ...
[X] YES <NP>

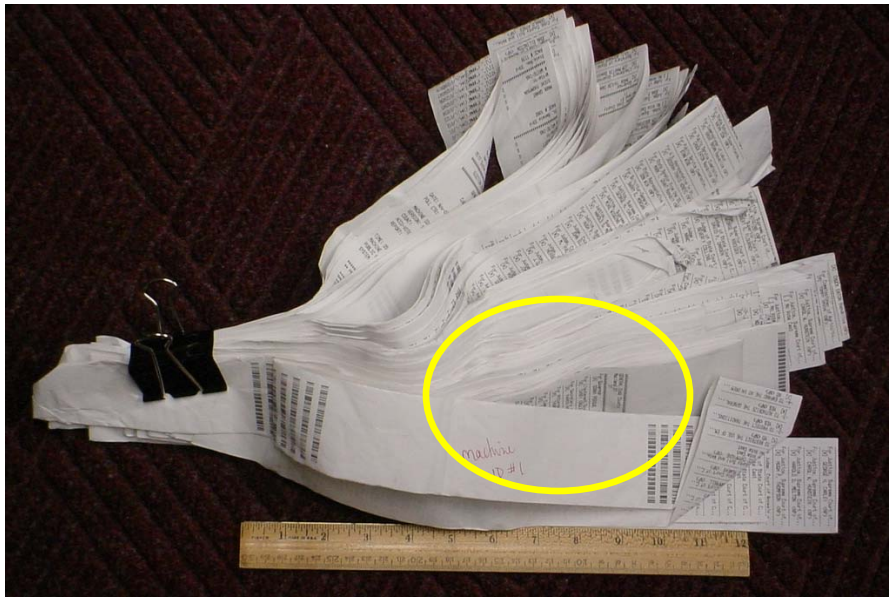
For
[X]
-D- TO PROVIDE A HOMESTEAD EX...
[X] YES <NP>

*** REJECTED ***

*** BALLOT CANCELLED ***

D. The Canisters and Tapes

Unwinding the tapes to get to the beginning was a challenge, and the resulting amount of tape was very difficult to work with throughout the process. None of the folding methods that we tried worked well for conveniently handling or storing the completed tapes. You have to touch nearly every tape to find the one you are looking for because there is no convenient way to label them. Also, if there were ever three canisters for any given TSX machine, only the human labeling would enable us to know which machine that middle tape belonged to. The current header that prints on the tapes does not contain that information.



The Problem of Labeling the Tapes

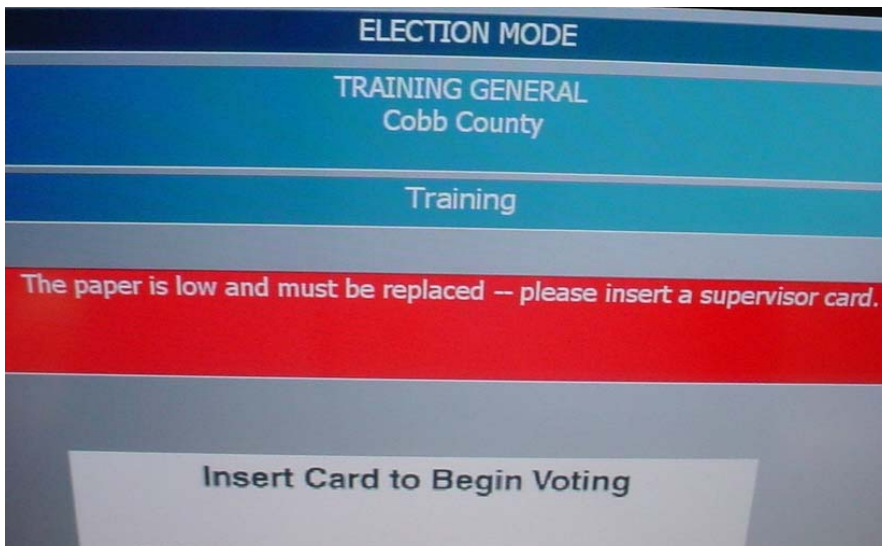
If this process were to be implemented county wide, we would have a massive handling and storage problem for these tapes. A method of unwinding would need to be worked out, and devices for storage designed. The paper that the tapes are printed on is “thermal paper”; therefore, it has to be stored in climate controlled conditions. Storage of tapes from the entire county would create a problem because with our current facilities there is no available space for storage of these tapes for 22 months.



Folded Tapes from 1 Precinct

E. Unexpected Problem

Based on our testing, we were expecting each machine to give a “Low Paper” message when it sensed that the paper on the roll was running out. In all of our testing, no matter how small the paper tape was, the machine always completed a voter’s ballot before giving the “Low Paper” message.



However, on Election Day, canister 15 ran out of paper right in the middle of printing the ballot for a voter. It printed some of the races onto the tape, but then the voter access card

popped out of the machine, and the machine displayed the “Insert Voter Access Card” screen with a red error message “Your ballot has been cancelled” and an additional pop-up message about a printer error. The poll manager issued another voter access card to the voter and allowed her to continue on a different machine. The first machine was then turned off to clear the error messages, the tape was replaced and other voters were allowed to use it. No further problems occurred.

VII. Conclusions

The manual audit has proven that the Touch Screens did count the votes accurately. However, it has also proven that having humans count by hand is not an efficient method of counting. Humans make lots of errors and have to go through the steps many times in order to get the right answers. Humans take a very long time to do what machines can do instantaneously.

If the manual audit process were to be mandated for the future, it should be for selected races only and selected precincts only. Otherwise, the time required would prevent us from ever being able to conduct the next election. For example, in the General Election in 2004, there were 229,231 ballots cast at the polls in Cobb County. If we extrapolate our experience of 5 minutes per ballot, it would have taken 19,102 hours to do a complete manual audit of that election. If we had fielded 20 teams working 40 hour weeks, it would have taken them 24 weeks to audit the General Election. It would have been May of 2005 before that audit was completed. However, we do not have a facility to house 20 teams, or enough capable and available personnel to create 20 teams; therefore, it could have taken even longer. Also, we know from the experience of managing 6 teams, that 20 teams would be way too many for us to manage with 3 managers. The price tag for such a project would have been approximately \$520,000.

The paper trail tapes should not be the official record of the election to be used for recounts. We would never be able to accomplish a recount in time to move on to the runoff or whatever election fell next in the election cycle. For example, in 2004 we had to recount a statewide Court of Appeals race. In Cobb County, there were 91,301 ballots cast. From our experience with the current audit, recounting one race on a long ballot took an average of .63 minutes per ballot. We estimate that recounting the Court of Appeals race manually would have taken a total of 958 hours, or 10 teams working 8-hour days for 12 days. There are only 15 work days between a Primary and its Runoff, or 20 work days between a General Election and its runoff. It would have cost approximately \$26,000. Most counties, including Cobb, do not have the facilities for housing 10 teams, or funds to rent a larger location; therefore, it could possibly have taken even longer than the estimated time.

According to SB 500, the equipment needed for the pilot project was leased by the State from Diebold ES. The equipment that we currently own cannot be retrofitted with the AVPM module. Therefore, if a decision is made to use this voting method, the first thing that must be done is to replace all of the voting equipment in Cobb County. We have 1600 Touch Screen units that were purchased for us by the State, as well as 466 units that

were purchased by Cobb County. The estimated cost of replacing all of this equipment just in Cobb County would be \$6.1 million.

The legislature should consider the cost versus the benefit when deciding whether to make this process a permanent part of Georgia elections.

Employee Code	Hours Per Person	Hourly Wage	Money Spent
A	13.50	\$9.09	\$122.72
B	14.25	\$8.74	\$124.55
C	7.25	\$9.73	\$70.54
D	7.00	\$11.15	\$78.05
E	15.50	\$8.74	\$135.47
F	16.75	\$8.74	\$146.40
G	6.25	\$11.15	\$69.69
H	11.25	\$16.67	\$187.54
I	10.00	\$8.74	\$87.40
J	13.00	\$10.10	\$131.30
K	10.75	\$8.74	\$93.96
L	25.25	\$11.15	\$281.54
M	8.75	\$8.74	\$76.48
N	17.50	\$8.74	\$152.95
O	16.50	\$8.74	\$144.21
P	13.50	\$8.74	\$117.99
Q	18.50	\$9.09	\$168.17
R	14.75	\$8.74	\$128.92
S	24.50	\$8.74	\$214.13
T	22.50	\$8.74	\$196.65
U	14.75	\$8.74	\$128.92
V	3.50	\$9.09	\$31.82
W	3.75	\$8.74	\$32.78
X	1.25	\$12.26	\$15.33
TOTAL	312.25		\$2,937.45

3 Managers Thurs./Fri./Mon. (8 hrs x 3 people x 3 days)

2 Managers Tues. (8 hrs x 2 people)

1 Manager Wed. (8 hrs x 1 person)

